IMPROVEMENTS TO TRUSSES

This application relates to the design of trusses.

Brief Summary of the Invention

The invention resides in a new truss geometry. The "channel truss" employs parallel longitudinal members or chords (typically four) to define the truss cross-section (typically rectangular). The "channel truss" also employs at least one additional (typically fifth) longitudinal member, also parallel to the other members, that additional member recessed within the cross-section defined by the other members, away from the planes passing through adjacent chords. The additional member is structurally interconnected with the other members, but the design of the "channel truss" is such that no structural elements impinge in the volume defined by the additional member and two adjacent main chords. The result is a truss having an open channel defined within its profile, which channel and fifth member have advantages that will be described below.

Applications of the "channel truss" and additional adapters and accessories therefore will be described.

Brief Description of the Drawings

FIG.1 is a section through a prior art truss having a rectangular truss having a rectangular crosssection.

FIG.2 is a side elevation of the prior art truss of FIG.1.

FIG.3 is a section through a "channel truss" of the present invention.

FIG.4 is a side elevation of the "channel truss" of FIG.3.

FIG.5 is a top/plan view of the "channel truss" of Figures 3 and 4.

Detailed Description

The application relates to trusses.

Long employed in various permanent applications, such as bridges and roofs, over the last thirty years an industry has arisen around the design, manufacture, and provision of trusses fabricated of aluminum, and intended for use in creating structures, often temporary, for the support of lighting equipment and scenic elements for live performances, special events, and displays.

Beginning in the early 1970s, companies supplying lighting and other equipment to such applications began designing and building trusses for their own use. Because of the competitive advantages to be gained with a truss of improved design and the relative ease with which new designs could be fabricated, a large number and wide variety of different designs produced over the years.

By the 1980s, increasing demand for such trusses lead to the rise of specialist companies designing and manufacturing them for sale (some spin-offs from companies that had built them for their own use). Examples of firms designing and producing such trusses include: James Thomas Engineering of ----, Tomcat Systems of ----, Total Fabrication of --, and Slick Systems of ----.

Thirty years of intense competition has produced a wide variety of truss designs.

This application relates to a novel improvement.

Refer now to FIG.1, a crosssection illustrating the minimum set of structural elements required by a rectangular truss. Four longitudinally-extending and parallel members "chords" 401, 402,

403, and 404 are provided, comprising extruded aluminum tubing, typically having an outer diameter in the 1.9" to 2" range. Typically, they are disposed to form a rectangular cross-section. (However, trusses using three such members to form a triangular crosssection are known.)

Cross-bracing 411, 412, 413, and 414, of aluminum extrusion, having the same or a smaller diameter than the chords, is used to connect the parallel members 401, 402, 403, and 404. Such crossbracing can be on the diagonal (as seen in the side elevation of FIG.2) and/or at right angles to the members, forming "rungs".

Refer now to Fig.3, where a "channel truss" is illustrated cross-section.

Like prior art trusses, such as illustrated in Figs.1-2, the "channel truss" employs parallel longitudinal members or chords 401, 402, 403, and 404 (for those trusses having a rectangular cross-section). However, the "channel truss" also employs at least one additional longitudinal member 501, also parallel to the other chords 401, 402, 403, and 404, that additional member 501 recessed within the cross-section defined by chords 401, 402, 403, and 404, and away from planes passing through adjacent such chords.

The additional member 501 is structurally interconnected with the chords 401, 402, 403, and 404, but the design of the "channel truss" is such that no structural elements impinge in the volume defined between the additional member 501 and two adjacent main chords, in the illustrated example, chords 401 and 402.

The result is a truss having an open channel, of generally triangular profile, defined within its cross-section or profile, which channel and additional member have a number of advantages:

In application, most trusses must accommodate quantities of multi-conductor cable running parallel to their longitudinal axis, typically laid along the top face of their rectangular cross-section. Considerable quantities of such cable may be involved, particularly on trusses used to support lighting fixtures. During the set-up period, such cables may need to be tied or taped down to prevent their falling off, and can present a sloppy appearance when seen in profile on the truss in use. When a technician "walks" the truss at its flown position, cable underfoot can interfere with his or her footing, presenting a safety hazard.

By orienting the "channel truss" with its channel upwards, cable laid atop the truss during setup falls into the recess formed by the channe. It is prevented from falling off the truss; can be readily and neatly tied down to additional member 501; and is recessed below the truss profile in use, presenting a cleaner appearance and reducing the impact of the cable on footing.

Another aspect of truss application is the need to balance certain loads under the truss itself. If, for example, a load (such as a piece of scenery) is hung from a truss, it is most conveniently hung from one chord or the other on the "bottom" side. The result, however, is that the load is asymmetrically applied to the truss causing (among other effects) the truss to rotate about its longitudinal axis, dropping one lower chord relative to the other, and causing the truss to seek its displaced center of gravity, shifting away from the heavier side. Techniques to compensate (notably changing the relative lengths of the two legs of the "spansets" used to hang the truss to a supporting chain motor, complicate the setup and are not exact. Where the truss is ground-supporterd by a lift or tower, such compensation is difficult or impossible, and the offset load will result in undesirable stresses on the system, including side loads and increased friction in the lifting process..

Whether oriented up or down, the "channel truss" affords the additional member 501, which is centered. By hanging a load from the additional member 501 (rather than, in this example, the traditional alternatives, chord 401 or 404) the load is centered under the truss; and no undesirable offset in load on the truss, with its undesirable associated effects, is produced

Another advantage of the "channel truss" is the "masking" that it affords to the adjacent edge of scenic and other elements attached to it. With the use of "channel truss", scenic elements or material can be attached to the additional member 501, not only centering it under the truss, but recessing the edge of the element behind the visible face of the truss, for a better appearance.

Another application is the use of "channel truss" to support "soft goods" - curtains and the like (more specifically, drops, legs, borders, and teasers). Such "soft goods" are typically provided with a reinforced top edge (using jute or synthetic webbing) in which grommets are installed on regular centers, to which lengths of tie line ("ties") are attached. The tie line "ties" are ties around a pipe or truss chord in order to hang the soft goods to which they are attached. Again, the grommets and ties are not attractive, and fabric panels (for example, velour) can be of substantial weight. When hung from a "channel truss", such grommets and ties are recessed in the channel 506A and a substantially cleaner appearance presented (as well as a balanced load).

While only a fifth additional member is illustrated, it will be understood that additional such members could be employed.

While the illustrated truss cross-section is rectangular, it will be understood that other designs are possible.

The "channel truss" of the present invention can be complemented by accessories and may be employed to novel benefit in other ways.

In some applications, it is desirable for a piece of scenery or soft goods to maintain a sliding connection with a linear track or cable to keep the attached edge in substantially the same plane. An example might be a curtain, which would otherwise billow out of the plane of the guide wire or track, potentially striking or fouling on other objects.

A Guide wire adapter, provided with pass holes that permit it to be sandwiched between the adjacent ends of any two truss sections or a truss section and another element. The adaptor provides pass holes, through which the same bolts used to attach the truss sections pass. The adaptor also mounts a means for attaching a guide wire, such means as a shoulder eye bolt. With one such guide wire adapter attached at each end of the desired travel, a guide wire may be stretched between the opposing eyebolts on the two guide wire adapters. The result is a guide wire recessed in the channel of the "channel truss". The result is a more attractive appearance and a substantially decreased likelihood that the guide wire itself will present a fouling hazard when not in use.